BNC Working Safety on Campus SOP 2020 Jun 10

Name of facility:  Biomolecular Nanotechnology Center

Date:  2020 June 10

Building/Room number:  Stanley / Room: 124, 127 (suite), 131, 133, 135, 137, 139, 142, 142B, 144, 144A, 146, 146A, 148, 148A.

Brief description of work performed in BNC microfabrication facility:

1. **Room 127 (Chemical processing, Biohood/Cell Culturing, MicroArray scanning, Optical Microscopy, Refrigeration, Sterilization)**
   a. Key processes performed
      i. Optical Microscopy (127, 127D, 127H)
      ii. Bacteria Cell culture/incubators (127A)
      iii. Mammalian Cell culture/incubators (127B)
      iv. Chemical Hood for processing (127)
      v. Microarray Scanning (127)
      vi. Refrigeration (127)
      vii. Combined Processes with other rooms.
         1. Differential Interference Contrast imaging (Room 148)
         2. Spin on film deposition (148, 146)
         3. Surface prep and cleaning (Room 142, 148)

2. **Room 131 (SEM/FIB) and Groves Lab Microscopy**
   a. Key Processes performed
      i. FEI SEM/FIB/EDX/EBSD/STEM/Nanoprobe
      ii. SEM prep
      iii. Groves Lab Cell Culture and Microscopy
      iv. Combined Processes with other rooms.
         1. SEM sputter coating (Room 144)
         2. Annealing and degassing prior to imaging (Room 142, 142B)

3. **Room 133 (XPS) and Marqusee Lab Single Cell Microscopy**
   a. Key Processes performed
      i. XPS
      ii. Marqusee Lab Single Cell Microscopy
      iii. Combined Processes with other rooms.
         1. Annealing and degassing prior to analysis (Room 142, 142B)

4. **Room 135 (Helium Ion Microscopy)**
   a. Key Processes performed
      i. Helium Ion Beam Etching
      ii. Helium Ion Beam Microscopy
      iii. Combined Processes with other rooms.
         1. Annealing and degassing prior to analysis (Room 142, 142B)
         2. Pre cleaning (Room 142, 144, 148)
5. **Room 124 (Machine Shop)**
   a. Key Processes performed
      i. Shop tools.
      ii. CNC milling

6. **Room 142 (Etching/Surface Modification/Bonding)**
   a. Key processes performed.
      i. Surface Modification/Bonding/Annealing
      ii. Dry Etching (Reactive Ion/Plasma Etching)
      iii. Wet Etching (Acid Etching)
      iv. Combined Processes with other rooms.
         1. Etching/Lithography (Room 148, 146)
         2. Etching/Film Deposition (Room 144)

7. **Room 142B (Annealing, Wafer Sawing)**
   a. Key processes performed.
      i. Oven/Furnace Annealing
      ii. Wafer sawing
      iii. Combined Processes with other rooms.
         1. Substrate prep and cleaning (Room 142, 144, 148)
         2. Pre or Post Bonding (Room 142)
         3. SEM/HIM/XPS analysis (Room 131, 133, 135)

8. **Room 144 (Thin Film Deposition, Hot Embossing)**
   a. Key processes performed.
      i. Magnetron Sputter Deposition
      ii. Thermal Evaporation Deposition
      iii. SEM thin film coating
      iv. Hot Embossing
      v. Electroplating
      vi. Combined Processes with other rooms.
         1. Surface prep and cleaning (Room 142, 144, 146, 148)
         2. Pre or post lithography (Room 146, 148)
         3. SEM analysis (Room 131)

9. **Room 144A (Silanization, PDMS degassing, 3D printer, Parylene C coating)**
   a. Key processes performed
      i. Vacuum Silanization
      ii. PDMS vacuum degassing
      iii. FormLab 3D printer
      iv. Parylene C vapor deposition
      v. Combined Processes with other rooms.
         1. Assembly of components (Room 127, 142)
         2. Spin on coating deposition (Room 146, 148)
10. Room 146 (Lithography 2, ElectroSpin, Perchloric Acid Etching)
   a. Key processes performed
      i. Optical Lithography
      ii. High Voltage ElectroSpin
      iii. Perchloric Acid Etching
      iv. Combined Processes with other rooms.
         1. Deposition for liftoff process (Room 144)
         2. Additional Masking (Room 148)

11. Room 148 (Lithography 1, Acid Etching, Solvent Cleaning, Optical Metrology)
   a. Key processes performed
      i. Optical Lithography
      ii. Solvent Cleaning
      iii. Acid Etching
      iv. Profilometry
      v. Optical Microscopy
      vi. Combined Processes with other rooms.
         1. Deposition for liftoff process (Room 144)
         2. Additional Masking (Room 146)

**Personnel:**
The BNC is a shared resource core facility. Personnel authorized to enter the BNC are:

1. **Staff**
   a. Frances Allen 24/7 access
   b. A J Gubser 24/7 access
   c. Naima Azgui 24/7 access
   d. Paul Lum 24/7 access

2. **BNC User**
   a. UC Berkeley PI, researcher, student authorized by VCR and BNC member completed campus EHS-101 and EHS-207, BNC safety orientation, and authorized scheduled access.
   b. Non-UC Berkeley PI, Industrial member completed campus EHS-101 and EHS-207 (or equivalent), BNC Safety orientation, and authorized scheduled access.

3. **Access and Scheduling Process**
   a. The scheduling and coordination of the facility users will be governed using a Google Calendar which is controlled by BNC staff. By standard BNC protocol, any facility user needing access and use of a particular instrument or process in the BNC must be trained and qualified. The qualification is performed by staff superuser. The access procedure is as follows:
      i. Note: *The application process to join the BNC must be preceded by completing all initial BNC safety training requirements stated in the BNC application and meeting with BNC managing director to discuss the users intended project.*
ii. Users needing access to instrument or process will contact a respective BNC staff member. User will request preferred windows of time for their specific instrument or process access. This includes training and qualification as needed. After qualification, the user will be given READ ONLY access to the Google calendar.

iii. Staff member will check and confirm BNC protocol signoffs for user qualification.

iv. Staff member will check Google calendar and schedule user accordingly avoiding social distancing and scheduling conflicts. Staff member will confirm scheduled time with user.

b. The Google Calendar will graphically contain scheduling information for all BNC instruments and processes as to review possible social distancing conflicts. The number of overlaps in Google Calendar will graphically show number of users at any time (REAL TIME) in the BNC.

**Location(s) with designated entry and exit pathways:**

**A. Microfabrication rooms (142, 142B, 144, 144A, 146, 146A, 148, 148A)**

a. Main BNC Entry/Exit
   i. Designated 137/139
   ii. Alternative 127

b. Inner BNC Hall area for moving room to room.

**B. Zeiss Helium Ion Microscopy (135)**

a. Main BNC Entry/Exit 137/139 with 135 back door preferred exit.

b. Inner BNC Hall area for transit.

**C. PHI XPS (133)**

a. Main BNC Entry/Exit 137/139 with 133 back door preferred exit.

b. Inner BNC Hall area for transit.

**D. FEI SEM (131)**

a. Main BNC Entry/Exit 127 via 127/131 access with 131 preferred exit.

b. Inner BNC Hall area to 144 for SEM sputtering transit if necessary.

**E. Cell and Tissue Culture (127, 127A, 127B)**

a. Main BNC Entry/Exit
   i. Designated 127 for both preferred entry and exit.
   ii. Access 131 for use of wet sink if necessary.

**F. Chemical Hoods, Microarray scanner, general lab equipment, refrigeration (127)**

a. Main BNC Entry/Exit
   i. Designated 127 for both preferred entry and exit.
   ii. Access 131 for use of wet sink if necessary.
Physical Distancing and Minimizing Interaction Measures:

The use of the scheduling calendar system (Google Calendar) under strict control by staff will ensure compliance with the density budget and avoid all social distancing mishaps or interactions.

However, due to the complexity of microfabrication processes and the need to use an array of instruments possibly in another area of the BNC complex. A possible social interaction may occur. This is resolved as follows. At all times, BNC users will maintain university guidelines, BNC safety procedures, and social distancing at all times and will coordinate with each other if they need to access a piece of equipment in another room.

Note that the BNC is organized with different processes and equipment in different rooms. Each room is separated by a door with glass windows. If the room is occupied, the requestor can ask the user in the room when they will be exiting or finished in the room. Until the equipment and room is available, the user can wait in their designated BNC room until informed. Note: This practice and method is based upon mutual respect and collaborative understanding which is communicated to all BNC users during their introductory training. It is also strictly enforced by the BNC staff.

Face Covering / PPE:

General Statement

1. BNC safety protocol requirements apply. Updated to specify gloves, face mask, and eye protection mandatory at all times.
2. Basic BNC safety already dictates eye protection and gloves upon entry into any BNC general microfabrication area (142, 142B, 144, and 144A).
3. Full cleanroom gowning face mask, eye protection, gloves, head cover, shoe cover, and lab coat are required for all lithography microfabrication areas (rooms 146, 148).
4. Cleaning station to be at BNC entry/exit points (rooms 137/139, 127) to wipe reusable eye protection glasses before use for personal eye protection. (note: VWR wipes)

Entering BNC

A. Microfabrication
   a. Enter via room 137/139
   b. Gown per respective requirement
      i. Lithography
         1. Gown in 137/139
         2. Facemask, Head cover, eye protection, shoe cover, gloves, lab coat.
      ii. Non-lithography
         1. Gown in 137/139
         2. Facemask, eye protection, gloves
B. SEM/XPS/HIM
   a. Enter via room 137/139
   b. PPE requirement
      i. Gloves
      ii. Facemask
      iii. Eye protection as necessary

Exiting BNC
A. Safety Glasses
   a. Wipe clean with VWR wipes or spray and wipe with cleaning solution.
   b. Returning to respective gowning area bin.
B. Lab Coats
   a. Return to gowning area.
C. Shoe Covers
   a. Dispose in trash bin.
D. Head Covers
   a. Dispose in trash bin.
E. Gloves
   a. Dispose in trash bin.

Sanitizing of Equipment and High Touch Surfaces:
Note: Microfabrication technology as well as the use of instruments such as SEM, HIM, and XPS are dependent upon cleanliness of surfaces as to prevent defects and contaminants or cross contaminants which can distort and destroy the research work being performed. Hence cleanliness is an engrained procedure in the BNC. This is a common industry standard.

CLEANING and now DISINFECTING with a combination with a mixture of diluted ETOH IS NOT AN OPTION FOR BNC USERS.

The wiping down of lab bench and equipment surfaces are required standard practices in the BNC cleanroom per BNC safety and good lab practice protocol. The surfaces are wiped before and after use by the BNC user.

Management of Common Areas:

CLEANING and now DISINFECTING with a combination with a mixture of diluted ETOH IS NOT AN OPTION FOR BNC USERS.

The door handles located within the BNC inner hall areas will be wiped down by the BNC staff once in the morning, noon, and afternoon.
**Limiting Physical Contact with Clients/User:**

This will be done using Google Calendar and email communications amongst staff and BNC users.

a. The BNC has established an entry/exit plan as to minimize social distancing conflicts and interactions to ensure physical distancing.

b. The density plan will allow only 4 BNC users at any time in the BNC. Equipment and processes are all located in dedicated rooms
   i. Microfabrication (rooms 142, 142B, 144, 144A, 146, 146A, 148, 148A)
   ii. Zeiss Helium Ion Microscope (room 135)
   iii. PHI X-ray Photoemission Spectroscopy (room 133)
   iv. FEI SEM/FIB/EDX/EBSD (room 131)
   v. Chemical hoods/Cell culture (127 suite)

c. Each dedicated room have designated entry and exit plans in combination with the density restrictions will minimize interactions.

d. Signage is posted as reminders at all BNC room entries and exits.

e. BNC staff have assigned office and working areas as to not cause social distancing conflicts and unnecessary interactions. But they are readily accessible to assist and take care of BNC maintenance, problems, or user questions.

**Certification of Return to Research Guidelines:**

I have read and acknowledged the contents, requirements, and responsibilities outlined in this Plan for Phased Return to Research.

I also agree to:

- Stay home if I have symptoms associated with COVID-19 or have come into contact with someone who has tested positive ([https://uhs.berkeley.edu/coronavirus-covid-19-information](https://uhs.berkeley.edu/coronavirus-covid-19-information))
- Follow all requirements by UCB, City of Berkeley and CDC for Covid safety
- Wear a face covering while on campus or working in the presence of others until the City of Berkeley announces a change to the order.
- Not wear gloves when touching common surfaces like doorknobs or light switches outside the BNC.
• Wash my hands with soap and water for at least 20 seconds upon entering the lab, removing gloves, and before departing. If the lab does not have a hand washing station, I will wash my hands prior to entering the lab.

• Complete the **ten-minute training** required COVID training set forth by campus.

• Discuss current operational protocol with the BNC Facility and Safety Manager, _______ Paul Lum______.

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**Contact:**

Facility Director Name: Paul Lum

Title: Managing Director

Email: p_lum@berkeley.edu

Phone: 510-666-3356
Due to the Campus Covid-19 Recovery and Reopening Guidelines, access to the BNC is restricted to users that have made SCHEDULED ARRANGEMENTS. The BNC has a limited occupancy at any single window of time to enforce social distancing and the prevention of virus transmission. BUT, it is really quite simple to access. If you have the need to access the BNC for your research, please schedule your BNC room or equipment usage by contacting:

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<tr>
<th>BNC Staff</th>
<th>Process / Equipment</th>
<th>Room Number</th>
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<tr>
<td>A J Gubser</td>
<td>FEI SEM/EDX/EBSD/FIB</td>
<td>131</td>
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<tr>
<td>Email: <a href="mailto:agubser@gmail.com">agubser@gmail.com</a></td>
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<tr>
<td>Frances Allen</td>
<td>Zeiss Helium Ion Microscope</td>
<td>135</td>
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<td>Email: <a href="mailto:fiallen@lbl.gov">fiallen@lbl.gov</a></td>
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<tr>
<td>Naima Azgui</td>
<td>PHI XPS, Microfabrication</td>
<td>133, 142, 142B, 144, 144A, 146, 148</td>
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<tr>
<td>Email: <a href="mailto:azgui@Berkeley.edu">azgui@Berkeley.edu</a></td>
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<tr>
<td>Paul Lum</td>
<td>Microfabrication, Cell Culture, Microscopy</td>
<td>127 (A,B,D,H), 142,142B, 144, 144A, 146, 148</td>
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<tr>
<td>Email: <a href="mailto:p_lum@Berkeley.edu">p_lum@Berkeley.edu</a></td>
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